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NEW ZEALAND

PATENTS ACT 1953

COMPLETE SPECIFICATION

Title of Invention:

Connector for earthmoving implements

Name, address and nationality of applicant(s) as in international application form:
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250811

Patents Form # 4

SEE ALSO
COMPLETE SPECIFICATION

NEW ZEALAND

Patents Act 1953

PROVISIONAL SPECIFICATION

Title: Connector for Earthmoving Implements

I: ***Bruce Archibald Short***
Nationality: New Zealand
Address: 18 Dampier Street, Avondale, Auckland, New Zealand
do hereby declare this invention to be described in the following statement :

This invention relates to connectors for earthmoving implements.

The specification of New Zealand patent #220557/222864 discloses a connector for facilitating the mounting and demounting of a variety of earthmoving implements to a vehicle such as digger or front end loader. This connector is useful for speeding up the changing of one implement to another. It comprises a body which is mounted on the digger and is provided with two recesses in which respective pins mounted on the implement are received in the process of mounting the implement in the digger. The first of the recesses is provided with a hydraulically operated closure member which retains the first pin in the first recess. The recesses are oriented at right angles to one another and because of this, as long as the first pin is held in the first recess by the closure member, the implement is locked to the connector.

It is an object of the present invention to provide a modified connector which is less expensive than the above described connector or at least to provide a connector of useful alternative design.

According to the present invention, a connector comprises a body, first connection means to enable the body to be mounted on a carrying device, second connection means to enable the body to be connected to an implement, the second connection means comprising spaced apart first and second recesses having entrances through which pins mounted on the implement can enter the respective recesses, at least the first recess being closable by a closure element which is mountable on the body and is movable between a closed position in which a portion of the closure element closes the entrance to the first recess and an open position in which said portion is withdrawn from the entrance to the first recess, the closure element being capable of being locked in the closed position by means of a wedge which is locatable between the closure element and the body and bears on the closure element to hold it in the closed position.

In one form of the invention the closure element comprises a base which can be mounted on the body and projects through a wall of the body for sliding movement between the open and closed positions, the base having an aperture in which the wedge is inserted so that the wedge bears on the wall to hold the closure element in the closed position.

According to one aspect of the invention said portion of the closure element is embodied in a hooking member which arises from the base and comprises a hook formation which, when the closure element is moved to the closed position, closes the entrance to the first recess and engages the pin therein.

In one form of the invention the body comprises two spaced apart side walls between which the closure element is slidably located, the closure element comprising two spaced apart said hooking members located one adjacent each side wall.

An embodiment of the invention is discussed by way of example with reference to the accompanying drawings in which:

Figure 1 is a perspective view of the body of a connector;

Figure 2 is a perspective view of the closure element of the connector;

Figure 3 is a cross sectional side view of the connector showing the closure element mounted in its working position on the body; and

Figure 4 is a detail of a modification of the connector shown in Figures 1 to 3.

Referring first to Figure 1, there is shown the body 10 of a connector (indicated at 12 in Figure 3) for connecting an implement (such as a bucket) to a vehicle such as a digger (not shown). The general nature and manner of use of the connector 12 will be clear to the instructed reader after reading this specification and the specification of New Zealand patent #220557/222864 as a whole, and need not be discussed in detail here. For the same reason it is not considered necessary to describe the digger or the implement. However, for ease of explanation, the pins by means of which the implement is attached to the connector are indicated at 14 and 16 respectively. These pins are fixed to the implement.

The body comprises two spaced, composite side walls 18, 20 joined at one end by a cross wall 22 and adjacent the other end by a generally cylindrical member 24. The side walls are substantially mutually similar but 'handed' so only one will be described. Each side wall comprises an outer plate 26 joined to an inner plate 28. The outer plates

are located at what for convenience will be referred to as the top of the body and each outer plate 26 is provided with two spaced holes 30, 32 through which pass pins, not shown, by means of which the body is attached to the arms of a digger or other vehicle. The connector 12 is not normally detached from the digger so that these pins remain at least semi-permanently in place in the holes 30, 32. The arms of the digger are located between the outer plates 26 of the respective sidewalls 18, 20.

The inner plate 28 comprises two recesses 34', 36, These recesses are disposed substantially at right angles one to the other so that the recess 34' opens to one end of the body (this end being the end adjacent which the cylindrical member 24 is located) and the recess 36 opens to what may conveniently be described as the bottom of the body. The pins 14, 16 enter the respective recesses 34', 36 and are retained therein in a manner which will be described in order to lock the implement on the connector.

The side walls 18, 20 are disposed parallel to each other and welded to the cross wall 22 adjacent parallel side edges 38, 40 of the latter to define a space 42 between the side walls. A rectangular slot 44 is cut in the cross wall. The slot is perpendicular to the side walls 18, 20 and spans the space 42.

The cylindrical member 24 comprises a round bar in which a longitudinally extending recess 34" is machined. The cross sectional shape of the recess 34" is identical to that of the recesses 34' in the side walls and the member 24 is oriented so that the recess 34" is aligned with the recesses 34'. The recesses 34', 34" thus present what is in effect a single recess 34 extending across the width of the body and opening to the end thereof.

The cross wall 22 and the outer and inner plates 26, 28 are all advantageously comprised of heavy steel plate. The cylindrical member 24 is preferably comprised of a steel round bar. All of these components are welded together. The cylindrical is heavy and costly to produce and thus, in an alternative construction, the cylindrical member is replaced by a flat plate which is welded between the two inner plates 28 and on which, as will be described, the closure element 50 bears. In this case the plates 28 will need to be reinforced by reinforcing rings welded to the outer faces of the plates 28. The reinforcing rings have recesses cut into them corresponding with the recesses 34'.

Referring now to Figure 2, the closure element 50 comprises a flat rectangular base plate 52 which fits neatly in the space 42 between the side walls of the body 10. Two substantially identical and mutually parallel locking plates 54, 56 are welded to the plate 52 adjacent the respective longer edges thereof. An aperture 58 is cut in the plate 52 adjacent one end 59 of the plate 52 which projects slidably through the slot 44 in the cross wall of the body. It may be noted that, adjacent its opposite end 60, the plate 52 bears slidably on the cylindrical member 24. Substantially identical hook formations 62 are cut into the locking plates. The locking plates, and in particular the hook formations 62, are positioned so that, when the plate 52 is slid along the aperture 44 in the body, bearing on the member 24, the locking plates move between an open position, in which the recesses 36 in the body are unobstructed, and a closed position in which the hook formations close the entrances to the respective recesses 36 and engage the pin 16. It is advantageous to provide that the inner faces of the hook formations are canted an angle of between 8° and 12° and preferably about 10° to the direction of motion of the plate 52. This prevents the hook formations from jamming against the pin 16 in the closed position and also reduces wear. At the same time it provides sufficient friction to prevent or at least substantially reduce any tendency for the closure element to work loose in use.

The aperture 58 is located between the end 59 of the plate 52 and the locking plates 54, 56.

The closure element is held in the closed position by means of a wedge 70 which passes through the aperture 58 and has angled faces which bear respectively on the outer face of the cross wall 22 and the end of the aperture 58. The angle between these faces must be selected so that the tendency for the wedge to work loose is minimised; at the same time the angle must not be so small that the wedge is jammed immovably in place. A suitable angle has been found to be between 8° and 12° and preferably about 10°. For safety reasons, a retaining pin may be located in one of the holes 72 in the wedge to prevent the wedge from falling out of the aperture should it work loose.

The base plates and the locking plates are also preferably fabricated from heavy steel plate and are welded together.

To prevent the closure element 50 from falling out of the aperture 44, a pin may be

provided in the end of the plate 52.

The connector 12 is substantially more simple to construct than known similar connectors. This is due not only to the provision of the wedging system but, as has been discovered in testing of the experimental prototypes, the provision of a sliding plate 52 which carries the locking plates 54, 56. Accordingly, it may be of advantage to provide a double acting hydraulic cylinder (shown in dotted outline at 76) mounted between the member 10 and the element 50 to move the element 50 between the open and closed positions.

It may be noted that the width of the recess 36 may be substantially greater than the diameter of the pin 16. The pin 16 is fixed in position on the implement and thus, when it is in the recess 36, cannot move (to the left in Figure 3) away from the pin 14, the latter being restrained by the recess 34. Thus, it is the locking element which functions to prevent the pin 16 from dropping out of the recess when the implement pivots about the pin 14 and the width of the recess 36 is, in this respect, of no account. This is a useful feature as it allows a variety of implements, having varying distances between centres of the pins 14 and 16, to be fitted to a connector of a given size. The hydraulic cylinder 76 could be replaced by a pneumatic cylinder or an electrically operated linear actuator or any other suitable actuating means.

In an alternative wedging arrangement, as shown in Figure 4, a shaft 90 may be pivotably mounted between the plates 28 adjacent the pin 16. The shaft carries a cam 92 which, with the shaft, pivots to bear on the pin 16. In the position shown in Figure 4, the cam has been pivoted so that the point at which it bears on the pin 16 is very close to the straight line through the centre of the shaft 90 and the centre of the pin 16. This is the closed position and the pin 16 (and hence the implement on which it is mounted) is held in this position by the wedging action of the cam 92 against the pin 16. To release the pin 16, the cam is pivoted (clockwise in Figure 4) away from the position shown to an open position in which the cam no longer obstructs the recess and the pin 16 is free to move out of the recess 36.

The cam shown in the drawing has a long curved surface of slowly increasing radius which bears on the pin 16 and terminates in an end portion of rapidly increasing radius. This has the advantage that the cam automatically compensates for wear. The end

portion acts as a stop to prevent the cam from being pivoted too far.

The cam can be actuated by any suitable means. One such means comprises an electrically operated linear actuator 92 which can be mounted between the member 10 and a lever 94 mounted on the shaft. The actuator can be mounted on either side of the lever. In the drawing the actuator is mounted on the cross wall 22 to the left of the lever. A hydraulic or pneumatic ram could replace the linear actuator 92. Alternatively the lever could be manually moved and held in place by a plate which is pivoted to the lever and passes through the cross wall 22. The plate could be held in place by means of a wedge system similar in principle to the wedge system shown in Figure 3.

It may be noted, in the construction shown in Figure 4, that the element 50 has been omitted and that the aperture 44 has been replaced by a smaller aperture to accommodate the actuator 92. An advantage to having the actuator 92 projecting through this smaller aperture is that it gives access to a screwing head 96 which may be turned by hand to extend the actuator and thus free the cam in case of an electrical power failure or in case the cam jams against the pin 16.

It is not intended that the scope of a patent granted in pursuance of the application of which this specification forms a part should exclude modifications and/or improvements to the embodiments described and/or illustrated which are within the spirit of the invention as defined herein or be limited by details of such embodiments further than is necessary to distinguish the invention from the prior art.

JAMES W PIPER & CO.
Attorneys for the Applicant
BRUCE ARCHIBALD SHORT

250811

WITH
PROVISIONAL SPECIFICATION

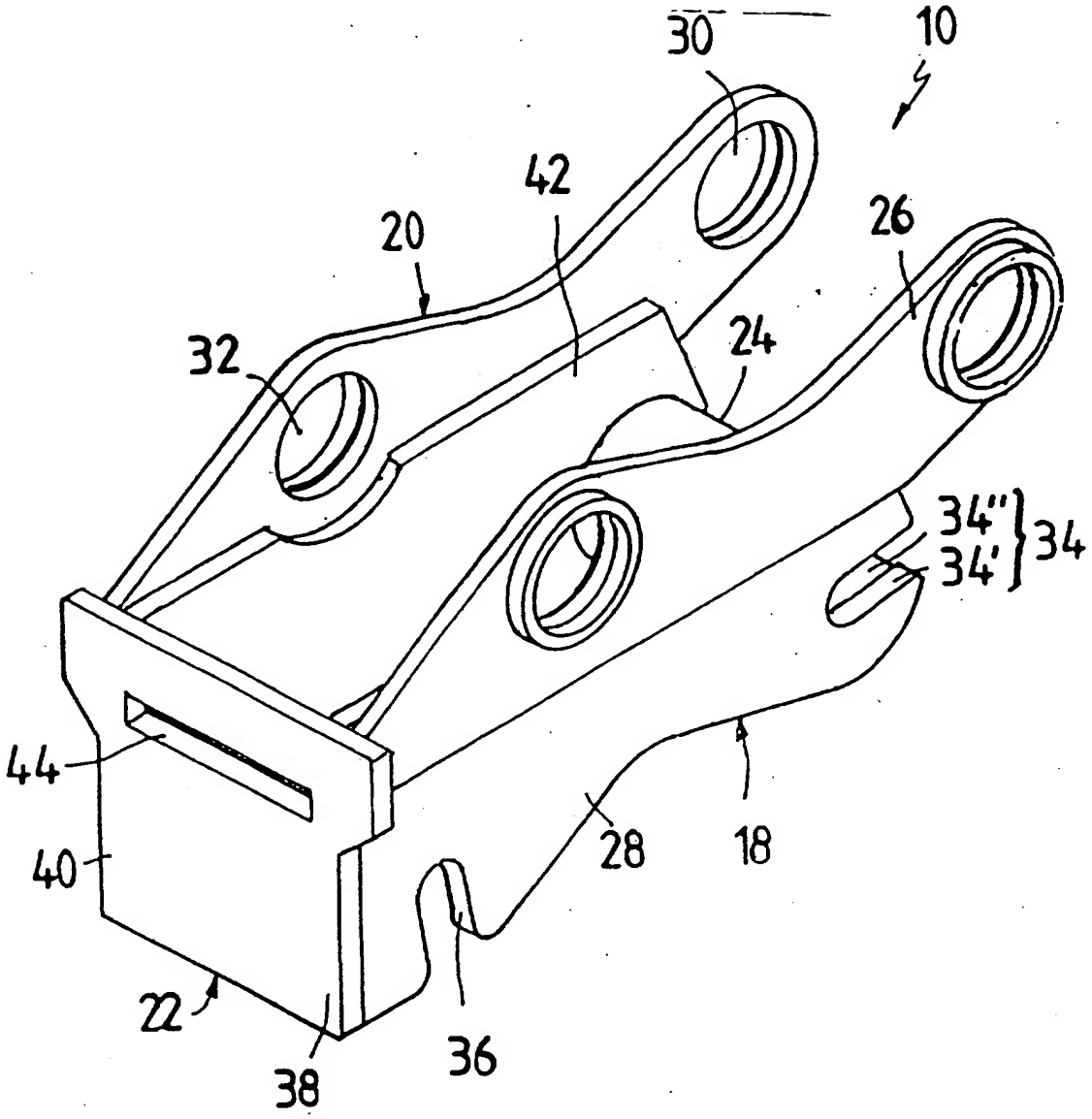

FIG. 1

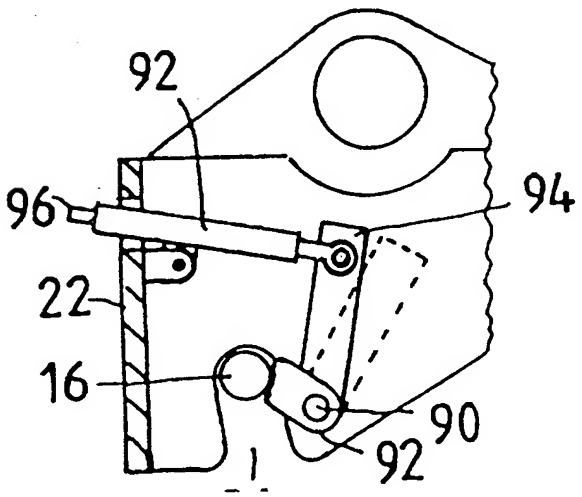

FIG. 4

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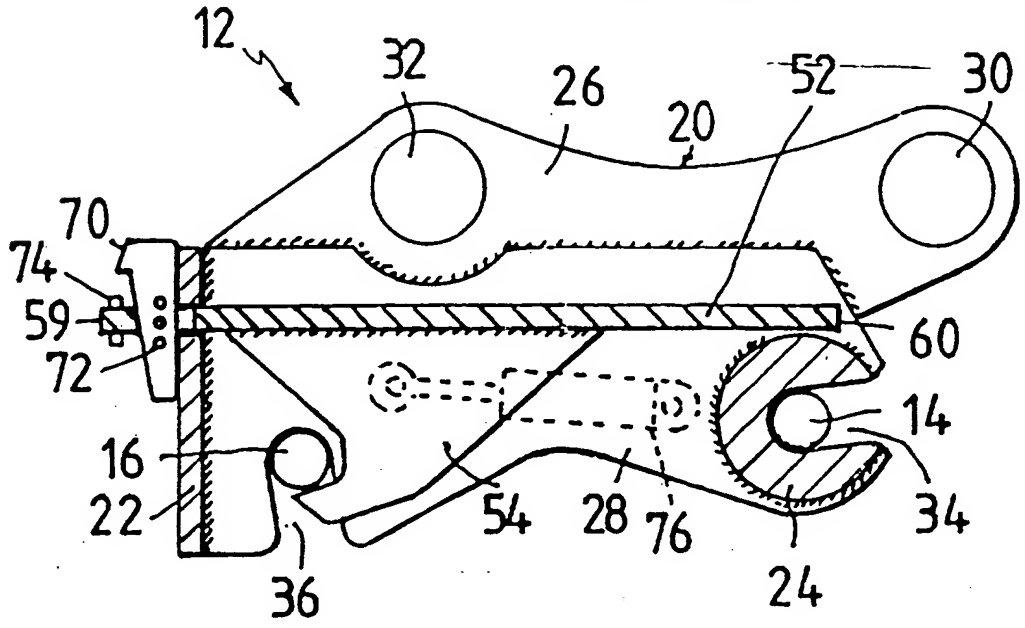

FIG. 3

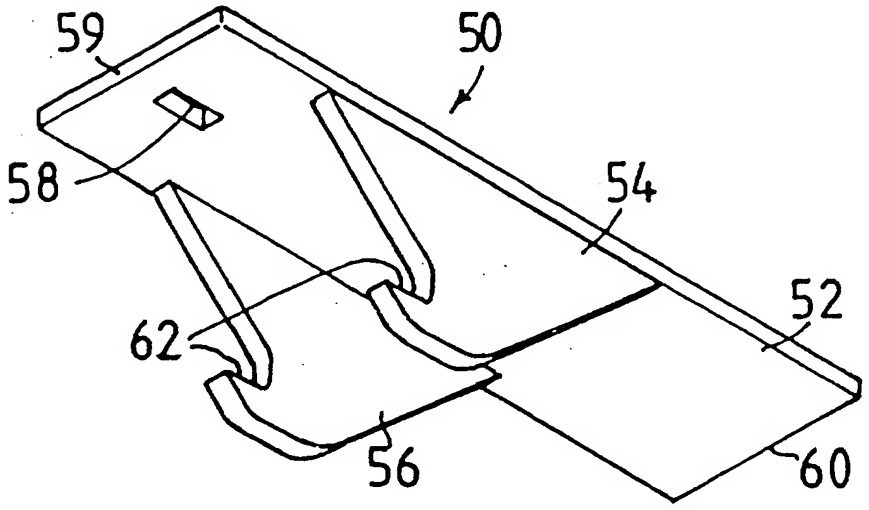

FIG. 2

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250811

Patents Form # 5

NEW ZEALAND
Patents Act 1953

COMPLETE SPECIFICATION

TITLE : **Connector for Earthmoving Implements**
APPLICATION # : **250811**
FILING DATE : **2 February 1994**

I, : ***Bruce Archibald Short***
Address: *18 Dampier Street, Avondale, Auckland, New Zealand*
Nationality: *New Zealand*
hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement :

PF05.JWP

FEE CODE - 1050

This invention relates to connectors for facilitating the mounting of implements on machines such as diggers, front end loaders, log handling machines and the like. Such machines will be referred to herein as "prime movers".

A number of such connectors are now commercially available. One such connector is disclosed in the specification of New Zealand patent #220557/222864. This connector is useful for speeding up the changing of one implement to another. It comprises a body which is mounted on the prime mover and is provided with two recesses in which respective pins mounted on the implement are received in the process of mounting the implement on the prime mover. The first of the recesses is provided with a hydraulically operated interlocking element which retains the first pin in the first recess. The recesses are oriented at right angles to one another and because of this, as long as the first pin is held in the first recess by the interlocking element, the implement is locked to the connector.

It is an object of the present invention to provide a modified connector which is less expensive than the above described connector or at least to provide a connector of useful alternative design.

According to the present invention, there is provided apparatus for connecting an implement to a prime mover, the apparatus comprising a body arranged to be mounted on the prime mover and mounting means for mounting the implement on the body, the body being provided with a recess arrangement comprising at least one recess for receiving a connecting member mounted on the implement, the mounting means comprising an interlocking element which is mountable on the body so as to be slidable between a closed position in which it holds the connecting member captive in the recess and an open position in which the interlocking element is withdrawn from the recess so that the connecting member can pass out of the recess, the interlocking element and the body being provided with abutments between which a locking device can be inserted when the interlocking element is in the closed position for locking the interlocking element in the closed position.

In one aspect of the invention, the interlocking element is mounted on the body for sliding movement between the open and closed positions.

In a further aspect of the invention the apparatus as described in either of the above two paragraphs further comprises a locking device, advantageously the locking device has opposed tapering surfaces arranged to engage the respective abutments with a wedging action.

In one aspect of the invention, the interlocking element comprises a portion which incorporates a slot for receiving the locking device and which traverses a surface of the body which is disposed transversely to the direction in which the interlocking element moves between the open and the closed positions, the slot having an end face which faces said surface, the surface and the end face constituting the respective abutments in the body and the interlocking element between which the locking device is inserted to lock the interlocking element in the closed position.

In one form of the invention, the body comprises two spaced apart walls and said surface comprises an outer surface of a cross wall of the body which extends between the two spaced apart walls.

Advantageously the portion of the interlocking element which incorporates the slot projects slidably through an aperture in the cross wall.

Advantageously the interlocking element is located between the two spaced apart walls and is preferably a close sliding fit between the spaced apart walls of the body.

In one form of the invention the body comprises two spaced apart walls between which the interlocking element is located.

In one aspect of the invention, the recess arrangement comprises at least two axially aligned recesses for receiving the connecting member, the axially aligned recesses being located one in each of the spaced apart walls.

In another aspect of the invention the recess arrangement comprises at least two spaced apart recesses respectively arranged to receive spaced apart connecting members mounted on the implement.

Advantageously the spaced apart recesses are disposed ~~at right angles~~, or nearly at right angles, one to the other.

According to one aspect of the invention the interlocking element comprises a formation which, when the interlocking element is moved to the closed position, engages the connecting member located in the recess with a wedging action.

In one form of the invention the interlocking element comprises two spaced apart formations which are located adjacent the respective spaced apart walls of the body and which, when the interlocking element is moved to the closed position, engage the connecting member located in the aligned recesses with a wedging action.

Advantageously, the interlocking element comprises a base which incorporates the slot and from which arise two spaced sides which are located adjacent the respective spaced apart walls of the body and which comprise said spaced apart formations.

In one aspect of the invention, the cross wall is located adjacent one end of the body and the body comprises a cross member which extends between the spaced apart walls adjacent an opposite end of the body, the base incorporating the slot at one end and at the other being supported by the cross member.

In one form of the invention the interlocking element is arranged to be moved between the open position and the closed position by a ram.

Advantageously the ram is located between the spaced sides of the interlocking element.

The invention is further discussed by way of example with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a body of a connector:

Figure 2 is a perspective view of an interlocking element of the connector;

Figure 3 is a cross sectional side view of the connector showing the interlocking

element mounted in its working position on the body;

Figure 4 is a detail of a modification of the connector shown in Figures 1 to 3; and

Figures 5 to 8 show somewhat schematically four stages in mounting an implement on a prime mover by means of the connector shown in Figures 1 to 3.

Referring first to Figure 1, there is shown the body 10 of a connector (indicated at 12 in Figure 3) for connecting an implement (such as a bucket) to a prime mover such as a digger. Neither the implement nor the prime mover are shown in Figures 1 to 4 but are respectively indicated at 90 and 92 in Figures 5 to 8. The general nature and manner of use of the connector 12 will be clear to the instructed reader and it is not considered necessary to describe the prime mover or the implement in detail. However, the implement is provided with two spaced pins by means of which the implement is attached to the connector. For ease of explanation these pins are indicated at 14 and 16 respectively in Figure 3. The pins are fixed to the implement and do not form part of the connector.

The body 10 comprises two spaced, composite side walls 18, 20 joined at one end by a cross wall 22 and adjacent the other end by a generally cylindrical cross member 24. The side walls are substantially mutually similar but 'handed'. Only one of them will be described. Each side wall comprises an outer plate 26 joined to an inner plate 28. The outer plates are located at what for convenience will be referred to as the top of the body. Each outer plate 26 is provided with two spaced holes 30, 32 through which pass pins, not shown in Figures 1 to 4 but indicated at 94 in Figures 5 to 8, by means of which the body is attached to the arms of a digger or other prime mover 92. The connector 12 is not normally detached from the prime mover so that these pins 94 remain at least semi-permanently in place in the holes 30, 32. The arms of the prime mover (indicated at 96 in Figures 5 to 8) are located between the outer plates 26 of the respective sidewalls 18, 20.

The inner plate 28 comprises two recesses 34', 36. These recesses are disposed substantially at right angles one to the other so that the recess 34' opens to one end of the body (this end being the end adjacent which the cylindrical cross member 24 is

located) and the recess 36 opens to what may conveniently be described as the bottom of the body. The pins 14, 16 enter the respective recesses 34', 36 and are retained therein in a manner which will be described in order to lock the implement on the connector.

The side walls 18, 20 are disposed parallel to each other and welded to the cross wall 22 adjacent parallel side edges 38, 40 of the latter to define a space 42 between the side walls. A rectangular aperture 44 is cut in the cross wall. The aperture is perpendicular to the side walls 18, 20 and spans the space 42.

The cylindrical cross member 24 comprises a round bar in which a longitudinally extending recess 34'' is machined. The cross sectional shape of the recess 34'' is identical to that of the recesses 34' in the side walls and the member 24 is oriented so that the recess 34'' is aligned with the recesses 34'. The recesses 34', 34'' thus present what is in effect a single recess 34 extending across the width of the body and opening to the end thereof. In principle, the recess 34'' can be omitted from the cylindrical cross member 24 so that, in this event, the body would comprise spaced, mutually aligned recesses 34'.

The cross wall 22 and the outer and inner plates 26 28 are all advantageously comprised of heavy steel plate. The cylindrical cross member 24 is preferably comprised of a steel round bar. All of these components are welded together. The cylindrical cross member is heavy and costly to produce and thus, in an alternative construction, the cylindrical cross member is replaced by a flat plate which is welded between the two inner plates 28 and on which, as will be described, the interlocking element 50 bears. In this case the plates 28 may need to be reinforced by reinforcing rings welded to the outer faces of the plates 28. The reinforcing rings have recesses cut into them corresponding with the recesses 34'.

Referring now to Figure 2, the interlocking element 50 comprises a flat rectangular base plate 52 which is a close sliding fit between the side walls of the body 10. The side walls thus serve as guides for the interlocking element 50. Two substantially identical and mutually parallel locking plates 54, 56 are welded to the plate 52 adjacent the respective longer edges thereof. A slot 58 is cut in the plate 52 adjacent an end 59 thereof which projects slidably through the aperture 44 in the cross wall of the body. It

may be noted that, adjacent its opposite end 60, the plate 52 bears slidably on the cylindrical member cross 24. Substantially identical hook formations 62 are cut into the locking plates. The locking plates, and in particular the hook formations 62, are positioned so that, when the plate 52 is slid along the aperture 44 in the body, bearing on the member 24, the locking plates move between an open position, in which the hook formation leave the pin 16 free to move in and out of the recesses 36, and a closed position in which the hook formations bear on the pin 16 with a wedging action, holding the pin 16 captive in the recesses 36 and tending to force the pin 16 deeper into the recesses 36. It is advantageous to provide that the inner faces of the hook formations are canted an angle of between 8° and 12° and preferably about 10° to the direction of motion of the plate 52. This prevents the hook formations from jamming against the pin 16 in the closed position and also reduces wear. At the same time it provides sufficient friction to prevent or at least substantially reduce any tendency for the interlocking element to work loose in use.

The slot 58 is located between the end 59 of the plate 52 and the locking plates 54, 56.

The interlocking element is held in the closed position by means of a wedge shaped locking key 70 which passes through the slot 58 and has angled faces which bear respectively on the outer face of the cross wall 22 and the end face of the aperture 58. The angle between these faces must be selected so that the tendency for the key to work loose is minimised; at the same time the angle must not be so small that the key is jammed immovably in place. A suitable angle has been found to be between 8° and 12° and preferably about 10°. For safety reasons, a retaining pin may be located in one of the holes 72 in the key to prevent the key from falling out of the slot should it work loose.

The base plates and the locking plates are also preferably fabricated from heavy steel plate and are welded together.

To prevent the interlocking element 50 from falling out of the aperture 44, a pin 74 may be provided in the end of the plate 52.

In the view of the applicant, the connector 12 is substantially more simple to construct than known similar connectors. This is due not only to the provision of the wedging

system but, as has been discovered in testing of the experimental prototypes, the provision of the sliding plate 52 which carries the locking plates 54, 56. Accordingly, it may be of advantage to provide a double acting hydraulic ram (shown in dotted outline at 76) anchored between the member 10 and the element 50 to move the element 50 between the open and closed positions. The ram 76 is advantageously located between the plates 56, 56 and below the plate 52.

However, the same advantage can be achieved even when the angle between the recesses is more or less than a right angle for the following reason. It may be noted that the width of the recesses 36 may be substantially greater than the diameter of the pin 16. The pins 14, 16 are fixed in position on the implement and thus, when it is in the recesses 36, the pin 16 cannot move (to the left in Figure 3) away from the recess 34 on account of the fact that movement of the pin 14 in the same direction is restrained by the recess 34. Thus, it is the interlocking element which functions to prevent the pin 16 from dropping out of the recesses 36 when the implement pivots about the pin 14 and the width of the recesses 36 is, in this respect, of no account. This is a useful feature as it allows a variety of implements, having varying distances between centres of the pins 14 and 16, to be fitted to a connector of a given size. Because the recesses 34 36 are at right angles to each other, the interlocking member need function to lock only one of the pins in the recesses.

The hydraulic cylinder 76 could be replaced by a pneumatic cylinder or an electrically operated linear actuator or any other suitable actuating means.

In an alternative wedging arrangement, as shown in Figure 4, a shaft 90 may be pivotably mounted between the plates 28 adjacent the pin 16. The shaft carries a cam 92 which, with the shaft, pivots to bear on the pin 16. In the position shown in Figure 4, the cam has been pivoted so that the point at which it bears on the pin 16 is very close to the straight line through the centre of the shaft 90 and the centre of the pin 16. This is the closed position and the pin 16 (and hence the implement on which it is mounted) is held in this position by the wedging action of the cam 92 against the pin 16. To release the pin 16, the cam is pivoted (clockwise in Figure 4) away from the position shown to an open position in which the cam no longer obstructs the recess and the pin 16 is free to move out of the recess 36.

The cam shown in the drawing has a curved surface of slowly increasing radius which bears on the pin 16 and terminates in an end portion of rapidly increasing radius. This has the advantage that the cam automatically compensates for wear. The end portion acts as a stop to prevent the cam from being pivoted too far.

The cam can be actuated by any suitable means. One such means comprises an electrically operated linear actuator 92 which can be mounted between the member 10 and a lever 94 mounted on the shaft. The actuator can be mounted on either side of the lever. In the drawing the actuator is mounted on the cross wall 22 to the left of the lever. A hydraulic or pneumatic ram could replace the linear actuator 92. Alternatively the lever could be manually moved and held in place by a plate which is pivoted to the lever and passes through the cross wall 22. The plate could be held in place by means of a wedge system similar in principle to the wedge system shown in Figure 3.

It may be noted, in the construction shown in Figure 4, that the element 50 has been omitted and that the aperture 44 has been replaced by a smaller aperture to accommodate the actuator 92. An advantage to having the actuator 92 projecting through this smaller aperture is that it gives access to a screwing head 96 which may be turned by hand to extend the actuator and thus free the cam in case of an electrical power failure or in case the cam jams against the pin 16.

In principle, a cross member similar to the cross member 24 may be mounted between the side walls adjacent the recesses 36. This cross member could be provided with a recess which is aligned with the recesses 36 so as in effect to replace the recesses 36 with a single recess (similar to the recess 34) which extends between the side walls 18, 20.

In principle, the hook formations 62 could project away from the cross wall 22. In this case the slot 58 would be located adjacent the inner face of the cross wall 22 and the key 70 would bear on the said inner face, its wedging action tending to force the plate 52 to the right in the drawings.

It is believed that Figures 5 to 8 will be substantially self explanatory. In Figure 5, the connector 12 is shown mounted on the arms 96 of the prime mover 92 and removed from the implement 90. The key 70 has been removed and the ram 76 retracted so that

the interlocking element 50 is in the open position and does not obstruct the recesses 36. The prime mover maneouvres the connector so that as a first step the pin 14 on the implement enters the recess 34. This stage is shown in Figure 6. With the interlocking element 50 still in the open position, the connector is pivoted about the pin 14 so that the pin 16 enters the recesses 36, as shown in Figure 7. The ram 76 now moves the interlocking element 50 to the closed position, locking the pin 16 in the recesses. The interlocking element 50 is locked in the closed position by means of the key 70 as shown in Figure 8.

In Figure 8 the key 70 is shown inverted for the purpose of indicating another alternative arrangement of the apparatus.

It is not intended that the scope of a patent granted in pursuance of the application of which this specification forms a part should exclude modifications and/or improvements to the embodiments described and/or illustrated which are within the scope of the invention as claimed herein or be limited by details of such embodiments further than is necessary to distinguish the invention from the prior art.

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WHAT WE CLAIM IS:

1.

Apparatus for connecting an implement to a prime mover, the apparatus comprising a body arranged to be mounted on the prime mover and mounting means for mounting the implement on the body, the body being provided with a recess arrangement comprising at least one recess for receiving a connecting member mounted on the implement, the mounting means comprising an interlocking element which is mountable on the body so as to be slidable between a closed position in which it holds the connecting member captive in the recess and an open position in which the interlocking element is withdrawn from the recess so that the connecting member can pass out of the recess, the interlocking element and the body being provided with abutments between which a locking device can be inserted when the interlocking element is in the closed position for locking the interlocking element in the closed position.

2.

Apparatus according to claim 1, in which the interlocking element is mounted on the body for sliding movement between the open and closed positions.

3.

Apparatus according to claim 1 or claim 2, wherein the apparatus further comprises a locking device, the locking device having opposed tapering in which the locking device has opposed tapering surfaces arranged to engage the respective abutments with a wedging action.

4.

Apparatus according to any one of claims 1 to 3, in which the interlocking element comprises a portion which incorporates a slot for receiving the locking device and which traverses a surface of the body which is disposed transversely to the direction in which the interlocking element moves between the open and the closed positions, the slot having an end face which faces said surface, the surface and the end face constituting the respective abutments in the body and the interlocking element between which the locking device is inserted to lock the interlocking element in the closed position.

5.
Apparatus according to claim 4, in which the body comprises two spaced apart walls and said surface comprises an outer surface of a cross wall of the body which extends between the two spaced apart walls.

6.
Apparatus according to claim 5, in which the portion of the interlocking element which incorporates the slot projects slidably through an aperture in the cross wall.

7.
Apparatus according to claim 5 or claim 6, in which the interlocking element is located between the two spaced apart walls.

8.
Apparatus according to any one of claims 1 to 4, in which the body comprises two spaced apart walls between which the interlocking element is located.

9.
Apparatus according to any one of claims 5 to 7, in which the recess arrangement comprises at least two axially aligned recesses for receiving the connecting member, the axially aligned recesses being located one in each of the spaced apart walls.

10.
Apparatus according to any one of claims 1 to 9, in which the recess arrangement comprises at least two spaced apart recesses respectively arranged to receive spaced apart connecting members mounted on the implement.

11.
Apparatus according to claim 10, in which the spaced apart recesses are disposed at right angles, or nearly at right angles, one to the other.

12.
Apparatus according to any one of claims 1 to 11, in which the interlocking element comprises a formation which, when the interlocking element is moved to the closed position, engages the connecting member located in the recess with a wedging action.

13.

Apparatus according to any one of claims 5 to 12, in which the interlocking element is a close sliding fit between the spaced apart walls of the body.

14.

Apparatus according to any one of claims 5 to 13, in which the interlocking element comprises two spaced apart formations which are located adjacent the respective spaced apart walls of the body and which, when the interlocking element is moved to the closed position, engage the connecting member located in the aligned recesses with a wedging action.

15.

Apparatus according to any one of claims 5 to 13, in which the interlocking element comprises a base which incorporates the slot and from which arise two spaced sides which are located adjacent the respective spaced apart walls of the body and which comprise formations which, when the interlocking element is moved to the closed position, engage the connecting member located in the aligned recesses in the side walls with a wedging action.

16.

Apparatus according to any one of claims 5 to 14, in which the cross wall is located adjacent one end of the body and the body comprises a cross member which extends between the spaced apart walls adjacent an opposite end of the body, the interlocking element comprising a base which at one end incorporates the slot and at the other end is arranged to be supported by the cross member.

17.

Apparatus according to claim 16, in which the interlocking element comprises two spaced sides which arise from the base and are located adjacent the respective spaced apart walls of the body, the sides comprising formations which, when the interlocking element is moved to the closed position, engage the connecting member located in the aligned recesses in the side walls with a wedging action.

18.
Apparatus according to claim 15 or claim 17, in which the interlocking element is arranged to be moved between the open position and the closed position by a ram located between the spaced sides of the interlocking element.

19.
Apparatus according to any one of claims 1 to 14, or claim 16, in which the interlocking element is arranged to be moved between the open position and the closed position by a ram.

20.
Apparatus for connecting an implement to a prime mover, substantially as herein described with reference to any one of the examples illustrated in the accompanying drawings.

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Attorneys for the Applicant
BRUCE ARCHIBALD SHORT

END OF CLAIMS

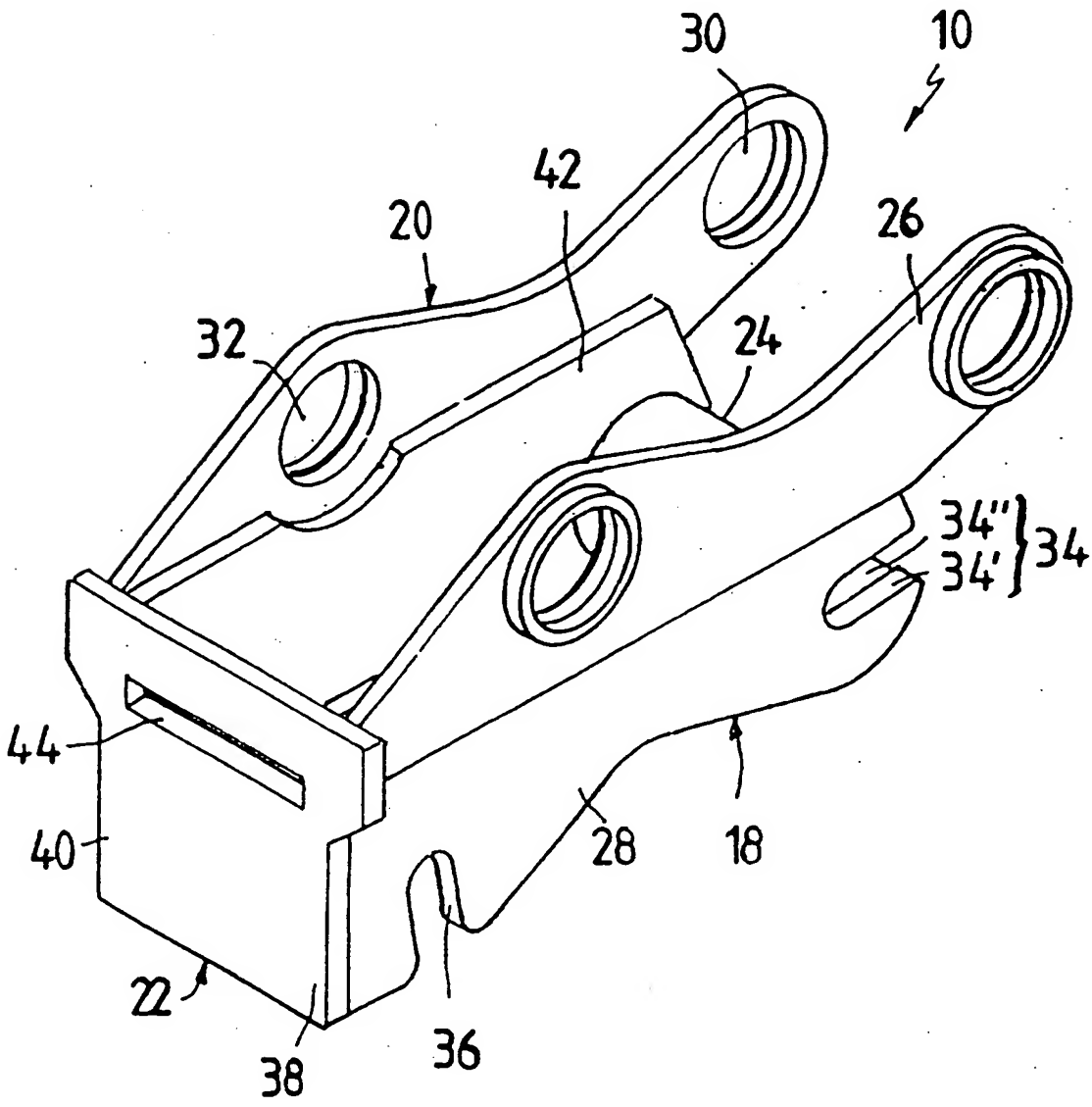

FIG. 1

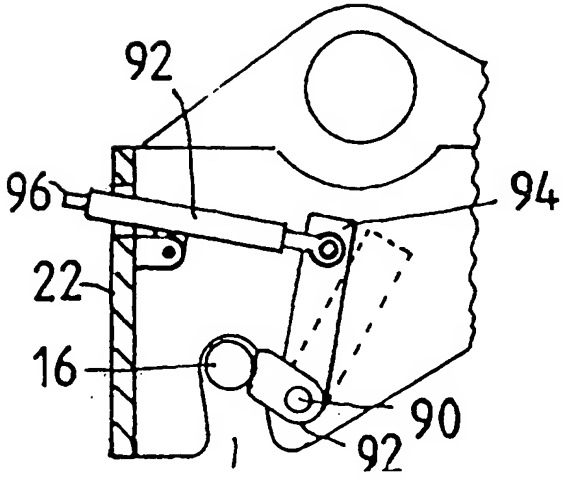

FIG. 4

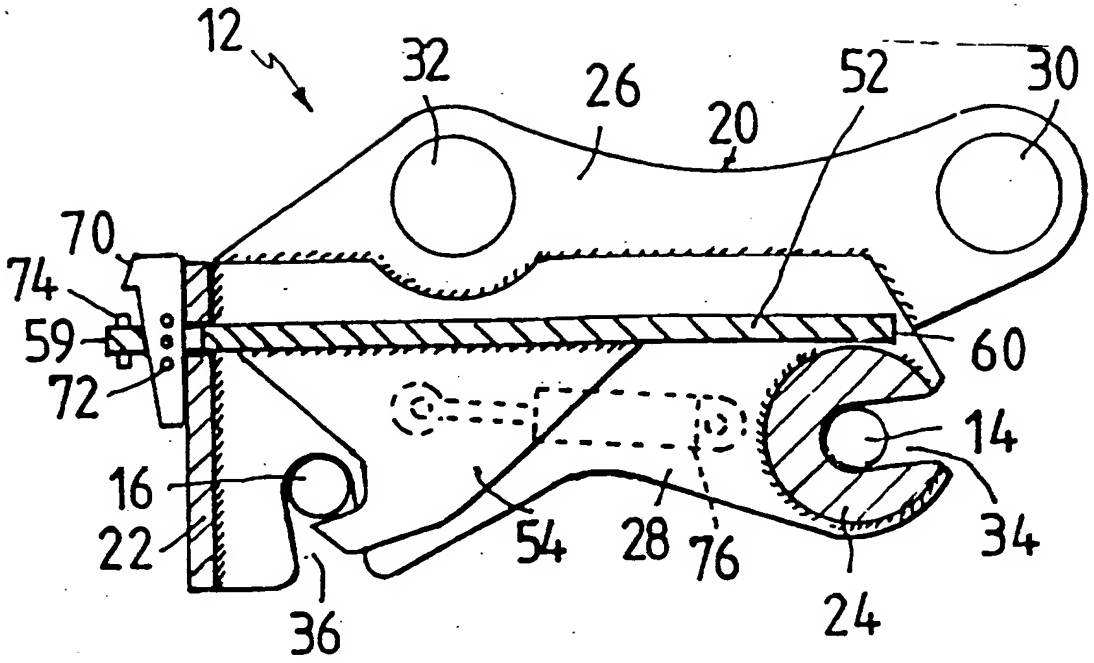

FIG. 3

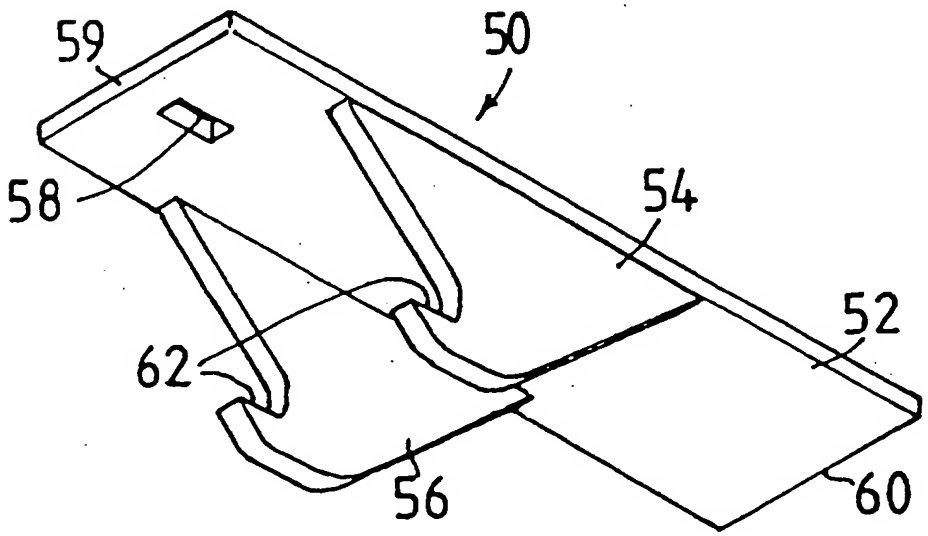

FIG. 2

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FIG. 5

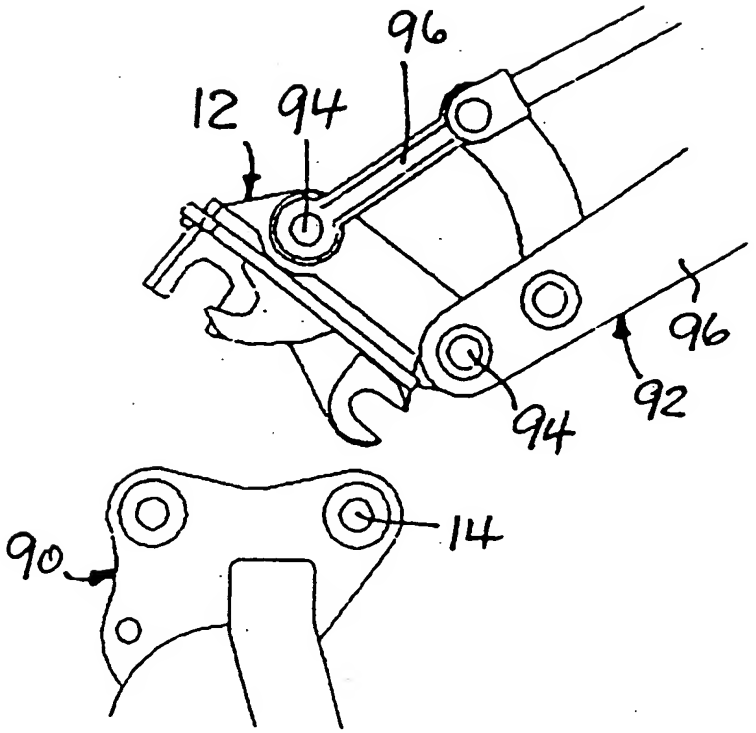


FIG. 6

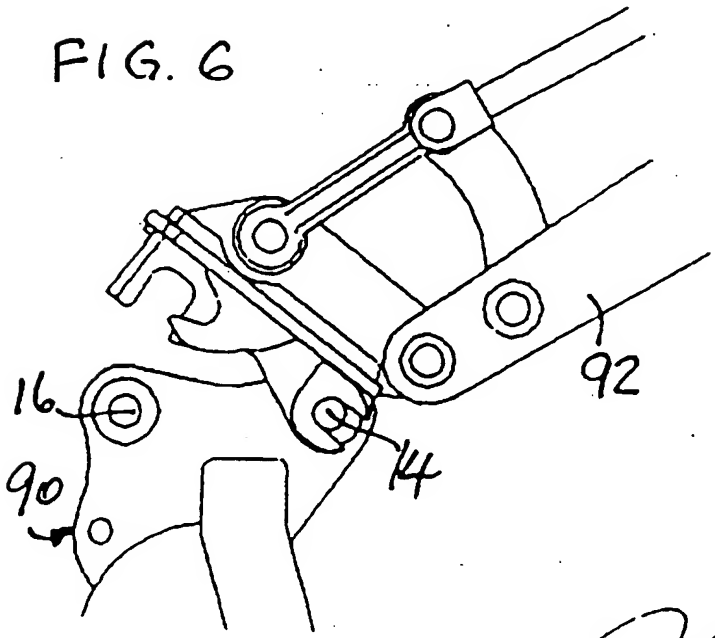


FIG. 7

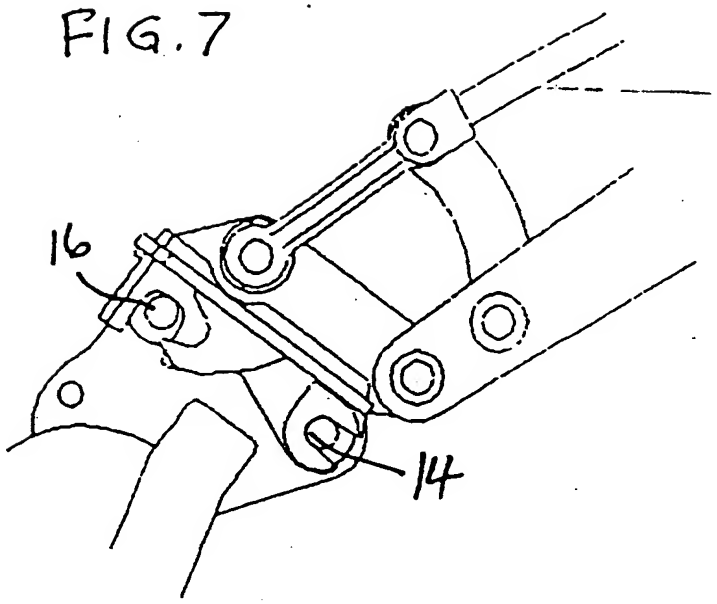
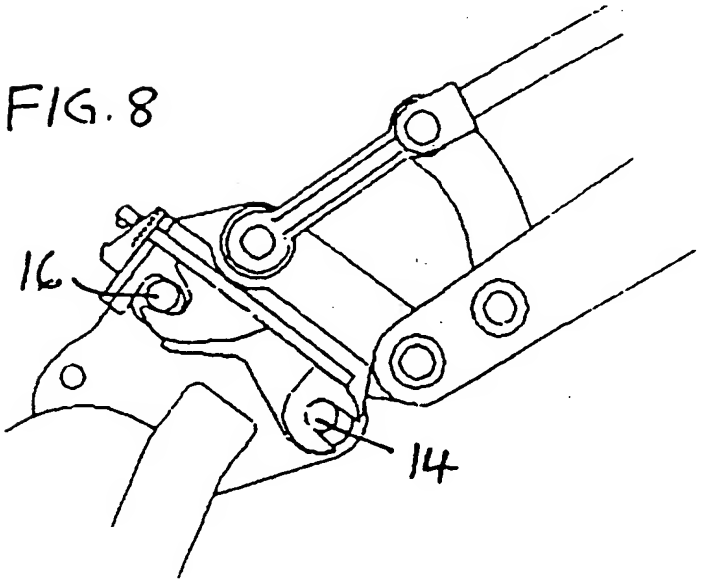


FIG. 8



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